TO AN EARLY PRIMROSE.

WRITTEN AT THE AGE OF 13 YEARS;

By Henry Kirke White.

MILD offspring of a dark and sullen sire!
Whose modest form, so delicately fine,
Was nurs'd in whirling storms
And cradled in the winds.

Thee, when young spring first question'd winter's sway,
And dar'd the sturdy blusterer to the fight,
Thee on this bank he threw
To mark his victory.

In this low vale the promise of the year,
Serene, thou openest to the nipping gale
Unnotic'd and alone,
Thy tender elegance.

So virtue blooms, brought forth amid the storms
Of chill adversity, in some lone walk
Of life, she rears her head
Obscure and unobserved:

While every bleaching breeze that on her blows,
Chastens her spotless purity of breast,
And hardens her to bear
Serene, the ills of life.

DICOVERIES AND IMPROVEMENTS IN ARTS, MANUFACTURES, AND AGRICULTURE.

Description of an Apparatus for collecting Gas from Coal, and of its use in lighting Manufactories and other large Buildings.—From Parks' Chemical Catechism.

CARBURETTED hydrogen gas, which is now employed in several parts of the kingdom for lighting large buildings, extensive manufactories, mines, &c., is procured in general from common pit coal by means of simple distillation. A variety of apparatus has been invented for this purpose, some of which are very complicated and difficult to be employed, and others are liable to accidents and explosions. The one which appears to have the greatest simplicity, and is at the same time perfectly safe in its application, may be thus described. The retort, within the furnace, is of cast iron; its larger end has an orifice of several inches diameter, for the admission of the coal and the withdrawing of the coak; which orifice is made to shut air-tight by means of an iron plug which screws within it; and to the smaller end of the retort a leaden pipe is affixed, in order to lengthen the apparatus and for the purpose of conveying the gas into the reservoir. This leaden pipe is generally bent into the form of an arch, to occasion more surface, and more effectually to cool the gas before it is delivered into the air-vessel or reservoir. The design of cooling the gas in this way is to occasion it to deposit the tar which always rises with it from the coal, and remains combined with it till it is somewhat reduced in temperature by passing along the leaden tubes. The two straight tubes passing from the extremities of the arch, and furnished with stop cocks, are designed to carry off this tar into a vessel placed beneath to receive it. If the tube connecting with the retort be a few feet in length, a part of the tar will run off by the first pipe, and in passing along the arched part of the tube, the gas will be further cooled, and more tar will be deposited*. The reservoir or receptacle for the gas is constructed on the principle of a common gasometer,

* The tube which rises nearly perpendicularly from the retort, and goes into the chimney, is designed to carry off the car-

and is made with two cylindrical vessels, one inverted within the other. These vessels may be of tin, or copper, or iron, or wood, as the proprietor chooses; and if economy be his first object, the gasometer may even be made with two common casks, the one inverted within the other. The inner vessel should be suspended from the ceiling of the apartment, by a cord or a chain passing over a pulley, and balanced at the other end by a corresponding weight. When the apparatus is thus fixed, water is poured into the outward vessel, so as to fill up the void space between it and the outside of the inner vessel; and the air is then expelled from the latter, by forcing it down to the bottom of the water. The inverted vessel is now become full of water instead of air (the air having passed off at an orifice provided for the purpose, and furnished with a stop cock,) and the whole apparatus is ready for use. After this description it will be seen that, whenever the carburetted hydrogen gas is disengaged from the retort, it must rush along the tube, and will rise into the interior of the inverted vessel, which is buoyed up, and continues to rise, so long as the gas continues to accumulate. This suspended and inverted vessel is the only reservoir for the gas, and in this it is safely preserved from escape by means of the water, which is an effectual lute for the apparatus. The quantity of gas in stock is always known by the height of the gasometer, which sinks by the common pressure of the atmosphere, as the gas is used, or withdrawn from beneath it. One of the tubes that rise within the gasometer, is designed to convey the gas into it from the retort, as has been described: the other is intended to convey it to the lamps in the different parts of the apartment. These lamps may be affixed to the main pipe, or smaller pipes may be conducted from thence into other apartments, or from one story of a building to another, as convenience may suggest; for if the gas be lighted it will burn with brilliancy, at any orifice, however distant it may be from the place where it is prepared. In extensive manufactories, small brass cocks are generally affixed to every aperture, in order to open or shut the communication with the gasometer, at pleasure, that there may be no waste of gas, and that such a number of lights may be had at all times as the manufactories may require.

Whenever a charge is worked off, the retort is opened, and the residuum raked out, which is an excellent coak, equal in value to the coal from which it was produced. Besides the coak, a large quantity of tar it soon collected, very useful in some of the Birmingham manufactures, and employed in making a cement for aqueducts, water-cisterns, &c. &c. According to Mr. Northern of Leeds, who has made some accurate experiments on this subject, 50 ounces of coal produce 6 ounces of liquid matter, oil, and tar; 26 ounces of coak, and 18 ounces of gas. Where the apparatus is well constructed, and the buildings required to be lighted are large, the process is very economical. Even several hundred pounds are annually saved in some large establishments, as I am informed, by the use of this gas; particularly in Birmingham, Manchester, and other large manufacturing towns. Some years ago the extensive iron-works and the compting-house of Messrs. Bolton and Watt, of Soho, near Birmingham, were lighted with it by Mr. William

bonic acid gas, and the water which come over in the beginning of the process, and would injure the carburetted hydrogen gas if suffered to mix with it.

Murdoch, of that place; who, as early as the year 1791, was engaged in a series of experiments on carburetted hydrogen gas, and was the first person who employed it in lighting apartments, &c. At the last peace, the whole of the buildings at Soho were illuminated by it in a way which occasioned a very grand and unique appearance. Since then, one of the streets of London has been lighted by the same means, and the effect produced is such, as to delight and satisfy every beholder. It is not only more cleanly than the old method, but the light is more beautiful, and far exceeds in intensity any of the lamps hitherto lighted with oil.

Morveau's Preservative Phials.—From the Same.

The portable phial contrived by Morveau for preventing contagion may be prepared thus:

Forty-six grains of black oxide of manganese in coarse powder, are to be put into a small strong glass phial, with an accurately ground stopper, to which must be added about two drachm measures of nitric acid of 1,400 specific gravity, and an equal measure of muriatic acid of 1.134; the stopper is then to be replaced, and the whole secured by inclosing the phial in a strong wooden case, with a cap which screws down so as to keep the stopper safe. It is to be used in hospitals, or other places of infection, by simply opening the phial, with the nose averted, and replacing the stopper as soon as the smell of the oxy-muriatic gas is perceived. A phial of this kind properly prepared, may be used several years without loosing its effect. The mixture, however, ought not to occupy more than one third of the bottle.

Of Lime and Water cement.—From the same.

Dr. Watson has remarked, that "in countries where they have no common materials for making lime, it would be worth while for the farmer to examine the earth which may be met with on the surface of the ground, or at a little distance below it; for that calcareous substances are not always united into hard compact masses, but are sometimes found in the form of loose earth, and that of different colours."

While writing on lime, some persons may be glad to be informed how a cement may be made with common lime, that will harden under water. What is called *poor* lime has this peculiar property; but as this species of limestone rarely occurs, it is often an expensive article. The following is a good substitute, and may be used for water cisterns, aqueducts, &c.—Mix four parts of gray clay, six of the black oxide of manganese, and ninety of good limestone reduced to fine powder; then calcine the whole to expel the carbonic acid. When this mixture has been well calcined and cooled, it is to be worked into the consistence of a soft paste with sixty parts of washed sand. If a lump of this cement be thrown into water it will harden immediately. Such mortar, however, may be procured at still less expense, by mixing with common quicklime a certain quantity of what are called the *white* iron ores, especially such as are poor in iron. These ores are chiefly composed of manganese and carbonate of lime, or chalk. Common lime and sand only, whatever may be the proportion of the mixture, will certainly become *soft* under water.

Of Lutes.—From the same.

Glazier's putty is a very good lute for all common purposes, but it is necessary that the whiting be made thoroughly dry before it be mixed with the oil. Linseed oil and